A NEW NUCLEAR PARADIGM

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Earlier this week, I spent substantial time on the subjects of nuclear non-proliferation, the proposed Comprehensive Test Ban Treaty, nuclear waste policies, and nuclear weapons design issues. The forums for these discussions were open and closed hearings of two major sub-committees of the United States Senate, a breakfast where two Cabinet secretaries joined l0 United States Senators, and private discussions with specialists in these fields.

During the week before, I spent time on the question of whether or not a l,200 foot road should be built in a National Monument, a monument whose enabling legislation I authored almost a decade ago.

Without demeaning any person's sense of perspective, I have to note to you today that for every person who attended the nuclear hearings, 50 attended the road hearings. And, for every inch of newspaper coverage the nuclear matters attracted, the road attracted 50 inches.

Strategic national issues just don't command a large audience. In no area has this been more evident during these last 25 years than in the critical and interrelated public policy questions involving energy, growth, and the role of nuclear technologies. As we leave the 20th Century, arguably the American Century, and head for a new millennium, we truly need to confront these strategic issues with careful logic and sound science.

We live in the dominant economic, military, and cultural entity in the world. Our principles of government and economics are increasingly becoming the principles of the world.

There are no secrets to our success, and there is no guarantee that, in the coming century, we will be the principal beneficiary of the seeds we have sown. There is competition in the world and serious strategic issues facing the United States cannot be overlooked.

The United States — like the rest of the industrialized world — is aging rapidly as our birth rates decline. Between 1995 and the year 2030, the number of people in the United States over age 65 will double from 34 million to 68 million. Just to maintain our standard of living, we need dramatic increases in productivity as a larger fraction of our population drops out of the workforce.

By 2030, 30 percent of the population of the industrialized nations will be over 60. The rest of the world — the countries that today are "unindustrialized" — will have only 16 percent of their population over age 60 and will be ready to boom.

As those nations build economies modeled after ours, there will be intense competition for the resources that underpin modern economies.

When it comes to energy, we have a serious, strategic problem. The United States currently consumes 25 percent of the world's energy production. However, developing countries are on track to increase their energy consumption by 48 percent between 1992 and 2010.

The United States currently produces and imports raw energy resources worth over $150 billion per year. Approximately $50 billion of that is imported oil or natural gas. We then process

that material into energy feedstocks such as gasoline. Those feedstocks, the energy we consume in our cars, factories, and electric plants, are worth $505 billion per year.

So, while we debate defense policy every year, we don't debate energy policy, even though it already costs us twice as much as our defense, other countries' consumption is growing dramatically, and energy shortages are likely to be a prime driver of future military challenges.

When I came to the Senate a quarter of a century ago, we debated our dependence on foreign sources of energy. We discussed energy independence, but we largely decided not to talk about nuclear policy options in public.

At the same time, the anti-nuclear movement conducted their campaign in a way that was tremendously appealing to mass media. Scientists, used to the peer-reviewed ways of scientific discourse, were unprepared to counter. They lost the debate.

Serious discussion about the role of nuclear energy in world stability, energy independence, and national security retreated into academia or classified sessions.

Today, it is extraordinarily difficult to conduct a debate on nuclear issues. Usually, the only thing produced is nasty political fallout.

I am going to bring back to the market place of ideas a more forthright discussion of nuclear policy.

My objective tonight is not to talk about talking about a policy. I am going to make some policy proposals. Tomorrow there are sessions on energy policy and nuclear proliferation. I'll give them something to talk about.

I am going to tell you that we made some bad decisions in the past that we have to change. Then I will tell you about some decisions we need to make now.

First, we need to recognize that the premises underpinning some of our nuclear policy decisions are wrong. In 1977, President Carter halted all U.S. efforts to reprocess spent nuclear fuel and develop mixed-oxide fuel (MOX) for our civilian reactors on the grounds that the plutonium could be diverted and eventually transformed into bombs. He argued that the United States should halt its reprocessing program as an example to other countries in the hope that they would follow suit.

The premise of the decision was wrong. Other countries do not follow the example of the United States if we make a decision that other countries view as economically or technically unsound. France, Great Britain, Japan, and Russia all now have MOX fuel programs.

This failure to address an incorrect premise has harmed our efforts to deal with spent nuclear fuel and the disposition of excess weapons material, as well as our ability to influence international reactor issues.

I'll cite another example. We regulate exposure to low levels of radiation using a so-called "linear no-threshold" model, the premise of which is that there is no "safe" level of exposure.

Our model forces us to regulate radiation to levels approaching 1 percent of natural background despite the fact that natural background can vary by 50 percent within the United States.

On the other hand, many scientists think that living cells, after millions of years of exposure to naturally occurring radiation, have adapted such that low levels of radiation cause very little if any harm. In fact, there are some studies that suggest exactly the opposite is true — that low doses of radiation may even improve health.

The truth is important. We spend over $5 billion each year to clean contaminated DOE sites to levels below 5 percent of background.

In this year's Energy and Water Appropriations Act, we initiated a ten year program to understand how radiation affects genomes and cells so that we can really understand how radiation affects living organisms. For the first time, we will develop radiation protection standards that are based on actual risk.

Let me cite another bad decision. You may recall that earlier this year, Hudson Foods recalled 25 million pounds of beef, some of which was contaminated by E. Coli. The Administration proposed tougher penalties and mandatory recalls that cost millions.

What you may not know is that the E. Coli bacteria can be killed by irradiating beef products. The irradiation has no effect on the beef. The FDA does not allow the process to be used on beef, even though it is allowed for poultry, pork, fruit and vegetables, largely because of opposition from some consumer groups that question its safety.

But there is no scientific evidence of danger. In fact, when the decision is left up to scientists, they opt for irradiation — the food that goes into space with our astronauts is irradiated.

I've talked about bad past decisions that haunt us today. Now I want to talk about decisions we need to make today.

The President has outlined a program to stabilize the U.S. production of carbon dioxide and other greenhouse gases at 1990 levels by some time between 2008 and 2012. Unfortunately, the President's goals are not achievable without seriously impacting our economy.

Our national laboratories have studied the issue. Their report indicates that to get to the President's goals we would have to impose a $50/ton carbon tax. That would result in an increase of 12.5 cents/gallon for gas and 1.5 cents/kilowatt-hour for electricity — almost a doubling of the current cost of coal or natural gas-generated electricity.

What the President should have said is that <u>we need nuclear energy to meet his goal</u>. After all, in 1996, nuclear power plants prevented the emission of 147 million metric tons of carbon, 2.5

million tons of nitrogen oxides, and 5 million tons of sulfur dioxide. Our electric utilities' emissions of those greenhouse gases were 25 percent lower than they would have been if fossil fuels had been used instead of nuclear energy.

Ironically, the technology we are relying on to achieve these results is over twenty years old. We have developed the next generation of nuclear power plants — which have been certified by the NRC and are now being sold overseas. They are even safer than our current models. Better yet, we have technologies under development like passively safe reactors, lead-bismuth reactors, and advanced liquid metal reactors that generate less waste and are proliferation resistant.

An excellent report by Dr. John Holdren for the President's Committee of Advisors on Science and Technology, calls for a sharply enhanced national effort. It urges a "properly focused R&D effort to see if the problems plaguing fission energy can be overcome — economics, safety, waste, and proliferation." I have long urged the conclusion of this report — that we dramatically increase spending in these areas for reasons ranging from reactor safety to non-proliferation.

I have not overlooked that nuclear waste issues loom as a roadblock to increased nuclear utilization. I will return to that subject.

For now, let me turn from nuclear power to nuclear weapons issues.

Our current stockpile is set by bilateral agreements with Russia. Bilateral agreements make sense if we are certain who our future nuclear adversaries will be and are useful to force a transparent build-down within Russia. But I will warn you that our next nuclear adversary may not be Russia — we do not want to find ourselves limited by a treaty with Russia in a conflict with another entity.

We need to decide what stockpile levels we really need for our own best interests to deal with any future adversary.

For that reason, I suggest that, within the limits imposed by START II, the United States move away from further treaty imposed limitations and move to what I call a "threat-based stockpile."

Based upon the threat I perceive right now, I think our stockpile could be reduced. We need to challenge our military planners to identify the minimum necessary stockpile size.

At the same time, as our stockpile is reduced and we are precluded from testing, we have to increase our confidence in the integrity of the remaining stockpile and our ability to reconstitute if the threat changes. Programs like science-based stockpile stewardship must be nurtured and supported carefully.

As we seriously review stockpile size, we should also consider stepping back from the nuclear cliff by de-alerting and carefully reexamining the necessity of the ground-based leg of the nuclear triad.

Costs certainly aren't the primary driver for our stockpile size, but if some of the actions I've

discussed were taken, I'd bet that as a bonus we'd see major budget savings. Now we spend about $30 billion each year supporting the triad.

Earlier I discussed the need to revisit some incorrect premises that caused us to make bad decisions in the past. I said that one of them, regarding reprocessing and MOX fuel, is ham-stringing our efforts to permanently dismantle nuclear weapons.

The dismantlement of tens of thousands of nuclear weapons in Russia and the United States has left both countries with large inventories of perfectly machined classified components that could allow each country to rapidly rebuild its nuclear arsenals.

Both countries should set a goal of converting those excess inventories into non-weapon shapes as quickly as possible. The more permanent those transformations and the more verification that can accompany the conversion of that material, the better.

Technical solutions exist. Pits can be transformed into non-weapons shapes and weapon material can be burned in reactors as MOX fuel, which by the way is what the National Academy of Sciences has recommended. However, the proposal to dispose of weapons plutonium as MOX runs into that old premise that MOX is bad despite its widespread use by our allies.

MOX <u>is</u> the best technical solution. I challenge you to develop a proposal that brings the economics of the MOX fuel cycle together with the need to dispose of weapons grade plutonium. Ideally, incentives can be developed to speed Russian materials conversion while reducing the cost of the U.S. effort. The idea for the U.S. Russian HEU Agreement originated at MIT, and I know that Harvard does not like to be upstaged.

I said earlier that I would not advocate increased use of nuclear energy and ignore the nuclear waste problem. The path we've been following on Yucca Mountain sure isn't leading anywhere very fast. I'm about ready to reexamine the whole premise for Yucca Mountain.

We're on a course to bury all our spent nuclear fuel, despite the fact that a spent nuclear fuel rod still has 60-75% of its energy content — and despite the fact that Nevadans need to be convinced that the material will not create a hazard for over 100,000 years.

Our decision to ban reprocessing forced us to a repository solution. Meanwhile, many other nations think it is dumb to just bury the energy-rich spent fuel and are reprocessing.

I propose we go somewhere between reprocessing and permanent disposal by using interim storage to keep our options open. Incidentally, 65 Senators agreed with the importance of interim storage, but the Administration has only threatened to veto any such progress and has shown no willingness to discuss alternatives.

Let me highlight one attractive option. A group from several of our largest companies, using technologies developed at three of our national laboratories and from Russian institutes and their nuclear navy, discussed with me an approach to use that waste for electrical generation. They use an

accelerator, not a reactor, so there is never any critical assembly. There is minimal processing, but carefully done so that weapons-grade materials are never separated out and so that international verification can be used. And when they get done, only a little material goes into a repository - but now the half lives are changed so that it's a hazard for perhaps 300 years — a far cry from 100,000 years. It sure would be easier to get acceptance of a 300 year, rather than a 100,000 year, hazard, especially when the 300 year case is also providing a source of clean electricity. This approach, called Accelerator Transmutation of Waste, is an area I want to see investigated aggressively.

I still haven't touched on all the issues imbedded in maximizing our nation's benefit from nuclear technologies, and I can't do that without a much longer speech.

For example, I haven't discussed the increasingly desperate need in the country for low level waste facilities like Ward Valley in California. In California, important medical and research procedures are at risk because the Administration continues to block the State government from fulfilling their responsibilities to care for low level waste.

And I haven't touched on the tremendous window of opportunity that we now have in the Former Soviet Union to expand programs that protect fissile material from moving onto the black market or to shift the activities of former Soviet weapons scientists onto commercial projects. Along with Senators Nunn and Lugar, I've led the charge for these programs. Those are programs directly in our national interest. I know that some national leaders still think of these programs as foreign aid, I believe they are sadly mistaken.

We are realizing some of the benefits of nuclear technologies today, but only a fraction of what we could realize —

Nuclear weapons, for all their horror, brought to an end 50 years of world-wide wars in which 60 million people died.

Nuclear power is providing about 20% of our electricity needs now and many of our citizens enjoy healthier longer lives through improved medical procedures that depend on nuclear processes.

But we aren't tapping the full potential of the nucleus for additional benefits. In the process, we are short-changing our citizens.

I hope in these remarks that I have succeeded in raising your awareness of the opportunities that our nation should be seizing to secure a better future for our citizens through careful reevaluation of many ill-conceived fears, policies and decisions that have seriously constrained our use of nuclear technologies.

Today I announce my intention to lead a new dialogue with serious discussion about the full range of nuclear technologies. I intend to provide national leadership to overcome barriers.

While some may continue to lament that the nuclear genie is out of his proverbial bottle, I'm ready to focus on harnessing that genie as effectively and fully as possible, for the largest set of benefits for our citizens.

I challenge all of you to join me in this dialogue to help secure these benefits.